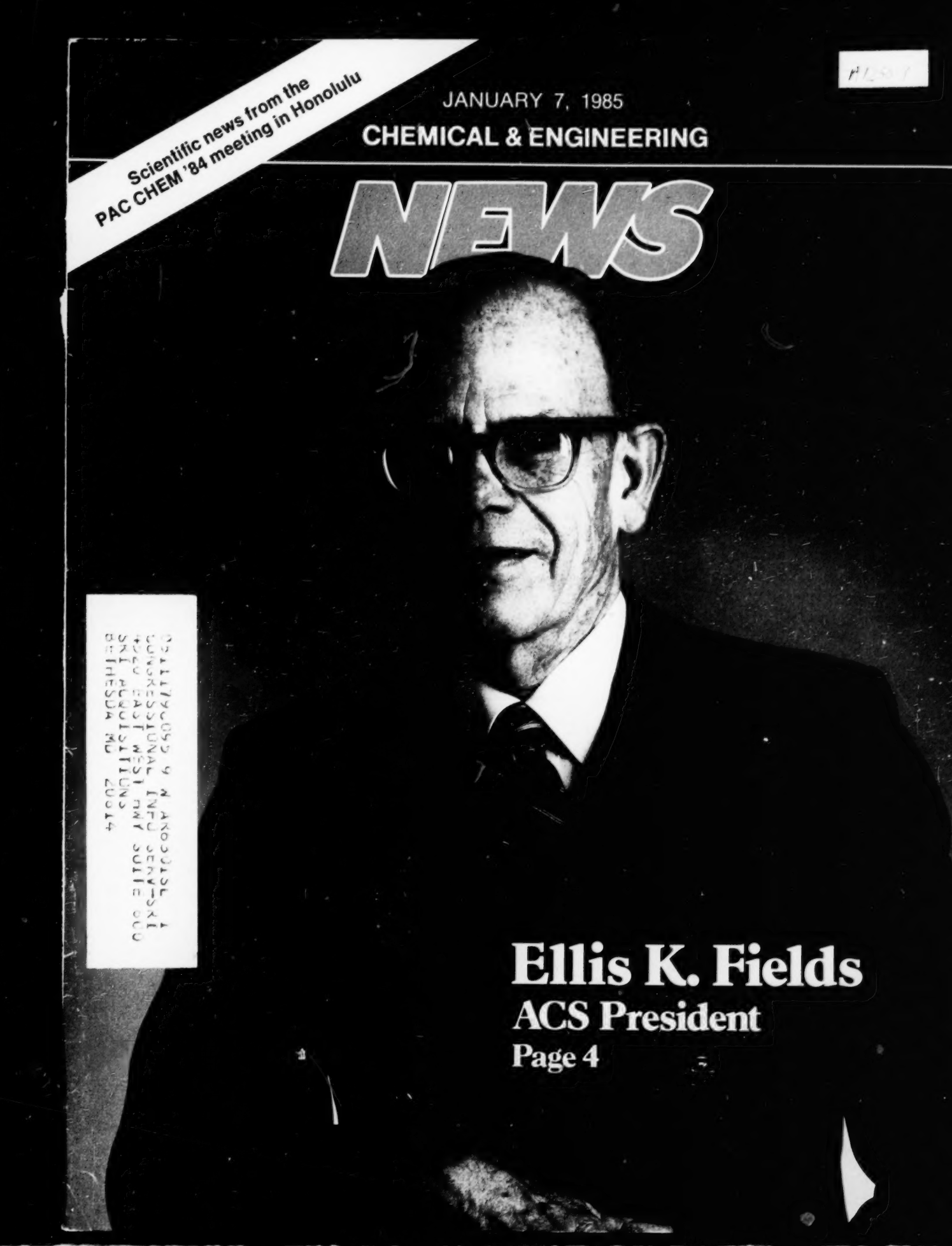
Scientific news from the PAC CHEM '84 meeting in Honolulu

JANUARY 7, 1985
CHEMICAL & ENGINEERING

NEWS



Ellis K. Fields
ACS President
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CHEMICAL & ENGINEERING NEWS

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News of the Week

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Business

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International Business

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Government

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Science

News from PAC CHEM '84: Chemical signals for predicting earthquakes; folk medicine as basis for new drugs; computer-based sound systems; concerted-twist mechanism; new perfluoroalkenyl reagents for synthesis; active metabolites of vitamin D_3; affinity partitioning method of cell separation. **Page 32**

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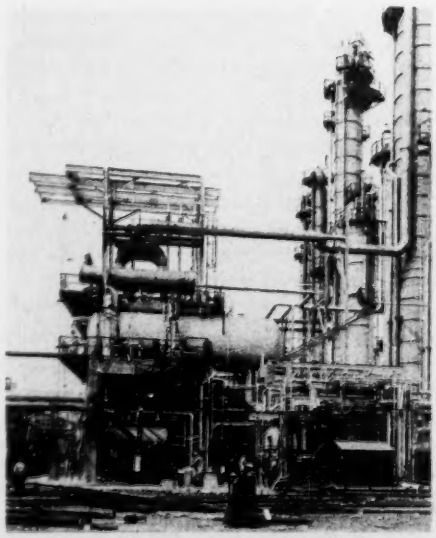


News Focus

Reshaping of chemical industry for industrialized and newly industrialized countries over remainder of the century is foreseen at PAC CHEM '84. **Page 13**

NRC report urges research on adhesives

The Department of Defense and the National Aeronautics & Space Administration are both quite interested in replacing mechanical fastenings with adhesive bonds because of potential savings in weight and manufacturing costs.

Such bonds have proved to be quite reliable under favorable conditions. But it has not been proved that adhesive bonds can meet the required 30-year durability test under conditions of high humidity, high temperature, and sustained loads.

What is needed, according to a report just issued by the National Research Council, is a major interdisciplinary research effort, spearheaded by the federal government. That effort should involve material science, surface science, mechanics, and process engineering. And it should recognize that adhesive bonding must be studied as a complete system.

The report, "Reliability of Adhesive Bonds under Severe Environments," grew out of a workshop organized by an NRC committee of the same name, chaired by Serge Gratch, director of Ford Motor Co.'s material and chemical sciences laboratory, and attended by about 100 invited experts. It was sponsored by DOD and NASA. A number of specific research recommendations in the fields of chemistry, interfaces, and mechanics were formulated during the workshop.

The recommendations for chemical research include:

- Synthetic work should be performed to investigate polymer-forming reactions that eliminate evolution of volatiles and provide moisture-resistant polymers with a favorable combination of adhesive properties.
- Basic synthetic work should be directed toward elimination of tenaciously held and toxic solvents, especially for high-temperature polymers.
- Studies on model high-temperature polymers should be conducted to generate fundamental information on the relationships among structure, cure, physical properties, and mechanical properties.
- New synthetic routes should be investigated to circumvent the need to use toxic monomers.
- Research should be aimed at toughening the adhesives, improving the processability of high-temperature adhesives, developing adhesives that alleviate the shortcomings of conventional epoxy adhesives, and studying crosslinking mechanisms to obtain fast-curing adhesives with no volatile products. □

Job outlook is good for spring grads

More job offers and higher starting salaries likely will face next spring's college graduates, according to Northwestern University's 1985 Endicott Report, an annual survey of the employment intentions of 250 medium-sized and large U.S. corporations.

The students will reap the benefits of the business community's strong confidence in continued economic growth into 1985. "The majority of firms snapped back from a mediocre 1983 and had a good year in 1984," says Victor R. Lindquist, director of placement at Northwestern and author of the report. "And they expect 1985 to be even better."

That confidence will translate into more job offers. "Corporations expect to hire 15% more students with bachelor's degrees and 13% more with master's degrees," Lindquist says. "Sixty-two percent of the firms will need more graduates with bachelor's degrees, and 44% will need more students with master's degrees."

He points out that "The confidence in the nation's economy by firms' personnel executives is contrary to the views of many professional economists who feel high interest rates, the federal deficit, and declining consumer demand will flatten the economy in the last two quarters of the year and perhaps be the beginning of a new recession." Should such forecasts begin to come true, he says, corporations could immediately slow down their hiring of college graduates.

Starting salaries will be up this year for college grads

	1984	1985	% change
BACHELOR'S DEGREE			
Engineering	$26,856	$28,860	4.8%
Accounting	19,884	20,628	3.7
Sales-marketing	20,040	20,616	2.9
Business administration	19,656	19,896	1.2
Liberal arts	18,840	18,828	0
Computer	22,860	24,156	5.7
Chemistry	23,280	24,216	4.0
Mathematics or statistics	22,140	22,704	2.5
Economics or finance	20,040	20,964	4.6
Other fields	20,484	21,972	7.3
MASTER'S DEGREES			
Engineering	29,532	30,900	4.6
Other technical fields	27,972	29,724	6.3
MBA with technical BS	30,228	31,800	5.2
MBA with nontechnical BA	28,440	30,348	6.7
Accounting	24,960	26,676	6.9
Other nontechnical fields	25,104	26,496	5.5

For bachelor's candidates, the biggest increase in job offers will be in the disciplines of economics and finance, up 65%, and business administration, up 33%. Engineering also will benefit, up 18%, and so will sales and marketing, up 14%, and computers, up 11%. At the master's level, demand for accounting majors will be especially strong, with 52% more offers going to next spring's graduates.

Salaries, too, will be up this year, Lindquist says. The biggest gains will be for graduates with master's degrees, where accounting majors' salary offers will be up almost 7%. At the bachelor's level, chemistry majors can expect a 4% increase in salary offers, and engineering majors a nearly 5% increase. □

China joins treaty on patents and trademarks

China has joined 95 other nations in becoming a party to the Paris Convention for the Protection of Industrial Property, the major international treaty on patents and trademarks. China's accession will take effect on March 19, 1985, shortly before its first patent law goes

Chemical Productivity's Erratic Pattern Causing Concern

William J. Storck, C&EN New York

As the U.S. economy continues to recover and talk abounds of a possible slowdown, some economists are closely watching productivity as an indicator of what may lie ahead. In the past, a slowdown in productivity growth or a decrease in productivity often has been a harbinger of a stagnating economy.

But so far, it's difficult to conclude much from figures available, especially about the chemical industry's productivity. Through the first nine months of 1984, productivity (output per workhour) in the country's entire manufacturing sector (including the chemical industry) increased from the previous year's nine-month period, as did productivity in the chemicals and allied products sector alone. However, on a quarter-to-quarter basis, productivity growth for all manufacturing has been increasing modestly, but for the chemical industry, that growth has been erratic.

Using government data for production and workhours, C&EN calculates that chemical productivity in the first three quarters of 1984 increased 5% to an index of 230.7 (1967 = 100) from the same period in 1983. At the same time, productivity for the all-manufacturing sector increased just 1.2% to an index of 177.6.

But it has not been an even course for chemical productivity. After its growth rate dwindled consistently throughout much of 1983, productivity actually fell in the first quarter of 1984. It then rebounded in the second quarter to a 2.6% increase

Productivity has risen slightly after first-quarter slump . . .

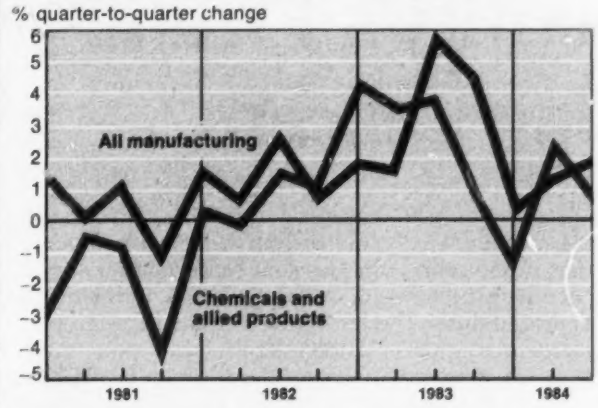
Indexes, 1967 = 100	Quarters, 1984			Quarters, 1983				Quarters, 1982			
	3rd	2nd	1st	4th	3rd	2nd	1st	4th	3rd	2nd	1st
CHEMICALS AND ALLIED PRODUCTS											
Production	231.5	229.1	223.8	225.0	220.9	211.4	201.9	194.2	195.4	195.1	199.4
Workhours	100.3	100.0	100.2	99.1	98.2	97.6	96.5	97.0	98.4	99.7	101.7
Productivity	230.7	229.1	223.3	227.1	225.0	216.5	209.1	200.3	198.6	195.7	196.1
Hourly production wages	359.8	355.1	352.3	350.0	343.1	338.8	335.1	331.3	324.8	317.6	312.3
Unit labor costs	156.0	155.0	157.7	154.1	152.5	156.5	160.2	165.4	163.6	162.3	159.2
ALL MANUFACTURING											
Production	167.2	164.4	161.0	156.6	152.8	145.2	138.4	134.4	137.7	138.1	139.8
Workhours	94.1	94.4	93.5	91.1	84.8	85.4	82.6	81.7	84.2	86.7	88.3
Productivity	177.6	174.2	172.1	171.9	180.3	170.1	167.6	164.4	163.6	159.2	158.5
Hourly production wages	325.5	323.4	321.9	318.1	313.4	311.0	309.2	305.3	303.0	299.9	297.0
Unit labor costs	183.3	185.7	187.0	185.0	173.8	182.8	184.5	185.7	185.2	188.4	187.4

. . . and for first three quarters of 1984, it continues climb from prerecession doldrums

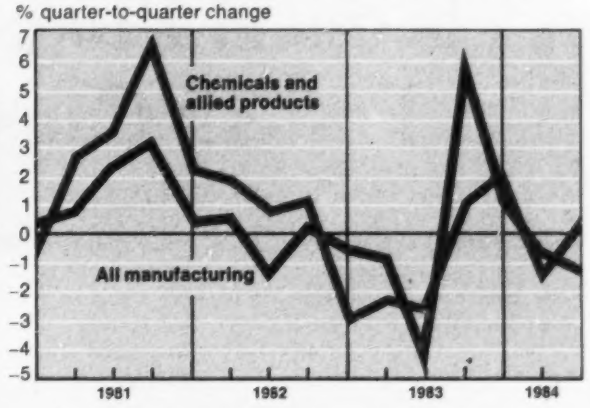
Indexes, 1967 = 100	1984[a]	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
CHEMICALS AND ALLIED PRODUCTS											
Production	228.1	215.8	196.1	215.6	206.6	210.4	197.4	185.7	170.9	147.2	159.4
Workhours	100.2	99.1	99.6	105.9	105.1	107.4	106.5	104.2	101.4	96.5	105.1
Productivity	227.7	217.8	196.9	203.5	196.6	195.9	185.4	178.3	168.6	152.6	151.7
Hourly production wages	355.7	341.6	321.3	294.2	267.7	245.2	226.5	207.4	190.6	173.9	157.4
Unit labor costs	156.2	156.8	163.2	144.6	136.2	125.1	122.1	116.3	113.1	113.9	103.8
ALL MANUFACTURING											
Production	164.2	148.3	137.6	150.4	146.6	153.2	146.8	138.4	130.3	116.3	129.4
Workhours	94.0	87.6	85.6	96.0	97.0	104.1	102.5	98.0	94.2	88.6	100.9
Productivity	174.6	169.2	160.8	156.7	151.2	147.1	143.3	141.2	138.3	131.2	128.2
Hourly production wages	323.6	313.5	301.4	283.3	257.8	237.6	218.8	201.4	185.1	171.3	156.7
Unit labor costs	185.3	185.3	187.5	180.8	170.5	161.5	152.7	142.7	133.9	130.5	122.3

a First nine months. Sources: Department of Labor, Federal Reserve Board

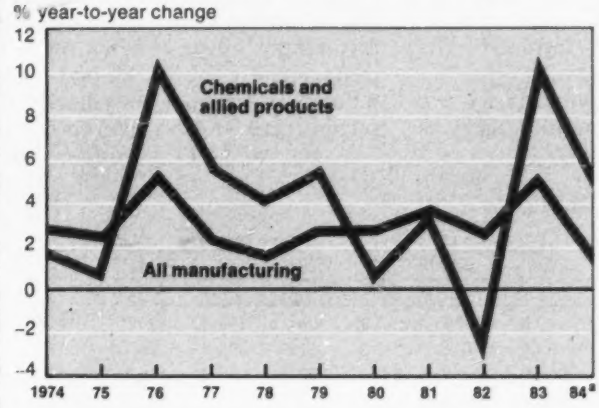
Quarterly gains in chemical productivity have lagged those for all manufacturing...



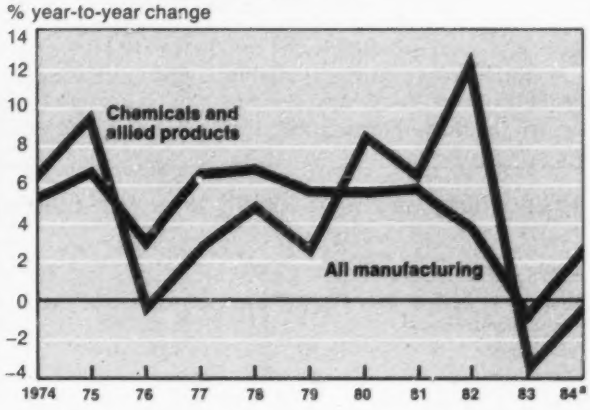
...giving faster rate of increase for chemical unit labor costs in past four years



But in 1984, productivity for chemicals rose faster than that for all manufacturing...



...helping to lower chemical unit labor costs, though only slightly



a First nine months of 1984. **Note:** Productivity is output per workhour, calculated by dividing indexes for production by indexes for workhours of production employees. Unit labor costs are labor costs per unit of output, calculated by dividing indexes for wages by indexes for output per workhour.
Sources: Department of Labor, Federal Reserve Board

and once again slowed in the third quarter to an increase of just 0.7%.

All manufacturing showed the same growth slowdown during 1983 and through first-quarter 1984, but its productivity never declined. In addition, since the first quarter, its growth rate has been rising modestly, up 1.2% in the second quarter and 2.0% in the third quarter.

Unit labor costs (production wages per unit of output) for the chemical industry give a picture that is little better. Unit labor costs in the first nine months of 1984 declined just 0.1% to an index of 156.2 (1967 = 100) from the same period the year before. However, on a quarter-to-quarter basis, unit labor costs in 1984 declined only in the second quarter, although in the third quarter they were up just 0.6% to an index of 156.0.

This is in contrast to all manufacturing, for which unit labor costs declined 0.7% in the second quarter and 1.3% in the third quarter to an index of 183.3. Nonetheless, unit labor costs rose 2.7% in the first nine months of 1984 to an index of 185.3, up 2.7% from the same period the year before.

Although chemical productivity remained at a 5% increase through the first nine months of 1984, the downward trend in the quarter-to-quarter changes bodes ill for a continuation of this 5% rate through the next year, let alone the next two years, unless something happens to boost chemical demand. Chemical workhours have remained fairly stable during the first nine months.

Some economists still are predicting that productivity in the general economy will increase, and it can be hoped the chemical industry will be pulled along on its coattails. For instance, the Conference Board said in a report late last month that U.S. productivity growth, which it called dismal over the past decade, is poised for a significant, long-term turnaround.

The New York City-based business research group says that the broadest measure of productivity in the private business sector rose 2.9% in 1983, one of the steepest jumps since World War II. And it predicts another impressive gain when final results are in for 1984. □